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CHARACTERIZATION TEST PROGRAM, JANTX DIODE  
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## JAN TRANSISTOR AND DIODE CHARACTERIZATION TEST PROGRAM

FINAL REPORT  
FOR  
JANTX DIODE

1N5623

FEBRUARY 1977

Prepared  
for

GEORGE C. MARSHALL SPACE FLIGHT CENTER  
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
Marshall Space Flight Center, Alabama 35812

MSFC/NASA CONTRACT No. NAS8-31944

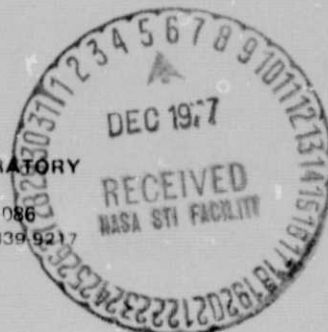
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DCA RELIABILITY LABORATORY

## FORWARD

This report is a statistical summary of the electrical characterization performed on NASA Contract NA8-31944. This is one of a group of thirty-nine (39) such reports prepared on selected JAN and JANTX Transistors and Diodes for the George C. Marshall Space Flight Center, Huntsville, Alabama. The Contracting Officer's Technical Representative was Mr. Howard B. Meeks.

This work was performed by DCA Reliability Laboratory, Special Products Division, Sunnyvale, California under the management of Mr. Robert Starr with the special assistance of Mr. Barry Lorenzo, Mr. Kenneth Radford and Mr. Hiroharu Takeda.

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## 1.0 INTRODUCTION

The objective of this characterization program is to provide the necessary data to create a new class of 19500 detail specifications "JAN A CLASS".

### 1.1 SAMPLE SELECTION

Sample selection was made according to the following criteria:

1. Manufacturer or qualified distributor.
2. Two vendors.
3. Two date codes.

### 1.2 PROCUREMENT GUIDELINES

The general guidelines for procurement were:

1. Two QPL vendors .
2. JAN or JANTX
3. Two (2) manufacturing lots (Date Codes), twenty-seven (27) from each lot.



## 2.0 TECHNICAL SUMMARY

The devices used in this report were JANTX 1N5623 Silicon Diodes manufactured by Micro Semiconductor and Semtech.

All data was acquired with three (3) digit accuracy. The data processing and calculation of statistical parameters was performed by the Tektronix S-3260 computer system using four (4) digit display.

### 2.1 TEST PARAMETERS AND CONDITIONS

2.1.1  $I_R$   $V_R = 1000V = (\text{Max. Rated } V_R)$   $T_A = 25^\circ C \text{ \& } 150^\circ C$

2.1.2  $V_{F1}$   $I_F = 300mA = (10\% \text{ of Rated } I_F)$   $T_A = 25^\circ C \text{ \& } -65^\circ C$

2.1.3  $V_{F2}$   $I_F = 1.5AMP (50\% \text{ of Rated } I_F)$   $T_A = 25^\circ C \text{ \& } -65^\circ C$

2.1.4  $V_{F3}$   $I_F = 3.0AMP (100\% \text{ of Rated } I_F)$   $T_A = 25^\circ C \text{ \& } -65^\circ C$

2.1.5  $C_{O1}$   $V_R = 0V$   $f = 100KHZ$   $T_A = 25^\circ C$

2.1.6  $C_{O2}$   $V_R = 0V$   $f = 1MHZ$   $T_A = 25^\circ C$

2.1.7  $t_{rr}$   $T_A = 25^\circ C$

## 2.2 UNIT DEFINITIONS

| NAME  | SYMBOL | MULTIPLIER |
|-------|--------|------------|
| Kilo  | K      | $10^3$     |
| Milli | M      | $10^{-3}$  |
| Micro | U      | $10^{-6}$  |
| Nano  | N      | $10^{-9}$  |
| Pico  | P      | $10^{-12}$ |

Example using a statistical summary section:

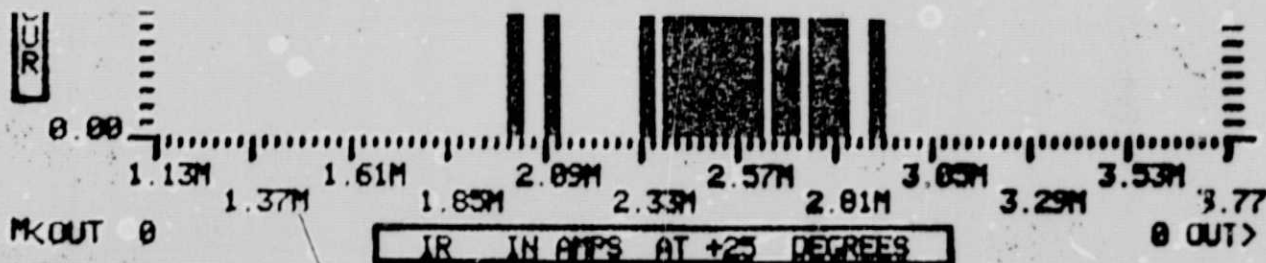
IR IN AMPS AT 25 DEGREES  
AT VR=2.64 VOLTS

|        |       |        |   |        |   |        |   |        |   |        |   |
|--------|-------|--------|---|--------|---|--------|---|--------|---|--------|---|
| !MOTO/ | 7603! | 2.534M | ! | 218.7U | ! | 2.010M | ! | 2.090M | ! | 2.780M | ! |
| !MOTO/ | 7550! | 2.423M | ! | 276.9U | ! | 2.010M | ! | 2.030M | ! | 2.780M | ! |
| !SIEM/ | 7508! | 2.997M | ! | 426.5U | ! | 1.820M | ! | 2.490M | ! | 3.480M | ! |

Milli

Micro

Example using a histogram:



Milli

ORIGINAL PAGE IS  
OF POOR QUALITY

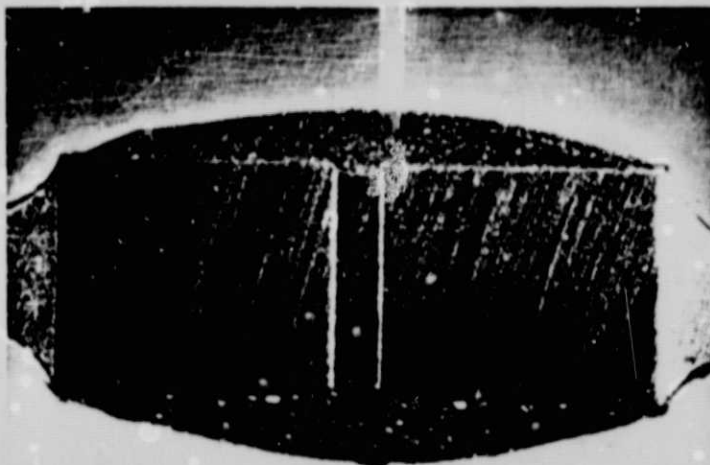


FIGURE 1

Device Number: IN5623  
25 Diameters  
D/C 7531

MFR: Semtech

Typical Overall Cross-  
Sectional View  
S/N EO27789

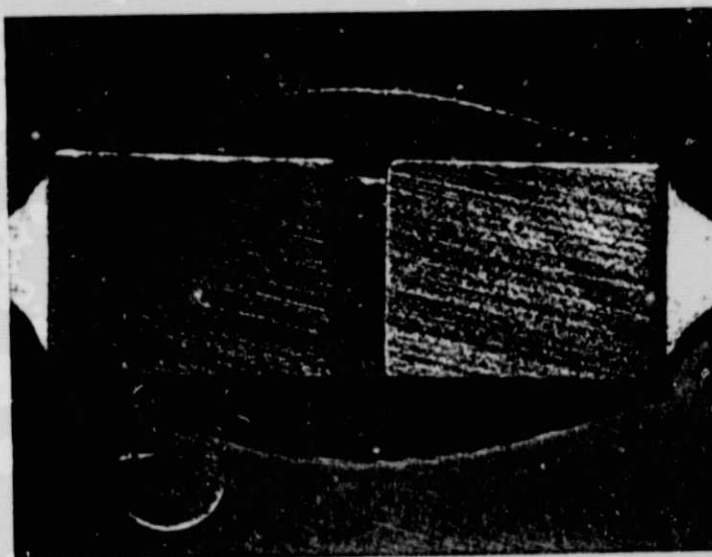


FIGURE 2

Device Number: IN5623  
25 Diameters  
D/C 7631

MFR: Semtech

Typical Overall Cross-  
Sectional View  
S/N EO27816

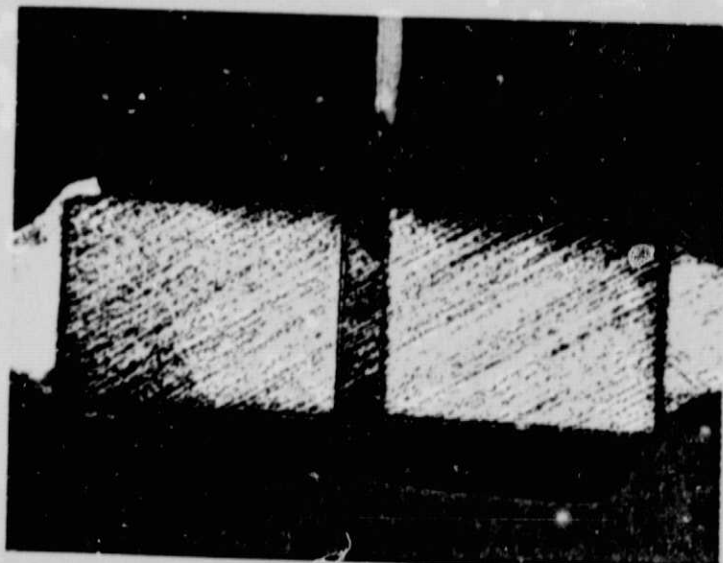


FIGURE 3

Device Number: IN5623  
27 Diameters  
D/C 7633

MFR: MSC

Typical Overall Cross-  
Sectional View  
S/N EO27843

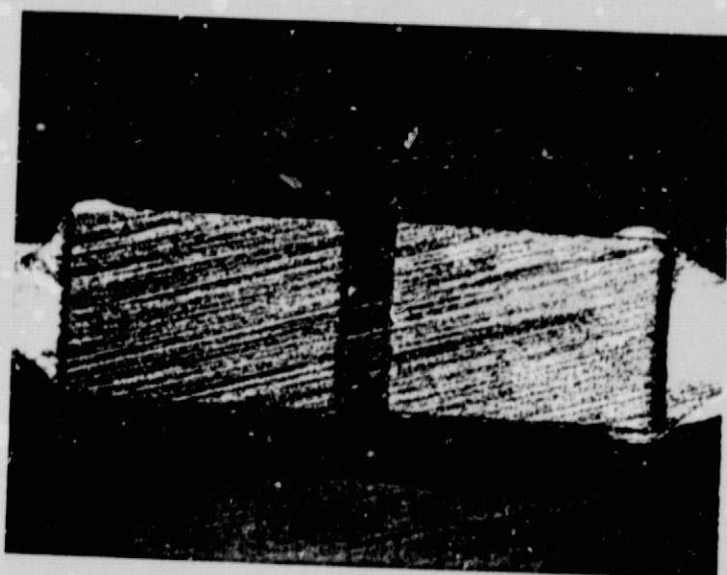


FIGURE 4

Device Number: IN5623  
27 Diameters  
D/C 7634

MFR: MSC

Typical Overall Cross-  
Sectional View  
S/N EO27870

### 3.0 STATISTICAL SUMMARY

The Statistical Summary, pages 3-2 to 3-4, are a consolidated presentation of the data acquired formatted for easy Vendor to Vendor and date code to date code analysis. Each parameter is presented with Test Conditions, Mean, Standard Deviation, Lowest Reading, 10% Point (where 10% of all readings are equal to or less than the indicated reading), 90% Point (where 90% of all readings are equal to or less than indicated reading) and the Highest Reading.

It should be noted the Mean presented in the summary may vary slightly from that presented on the Histograms due to a slight variation in the data base used for calculation.

#### EXAMPLE:

MICRO. SEMICONDUCTOR:       $I_R$        $V_R = 1000V$        $T_A = 25^{\circ}C$

Summary:                      MEAN      1.500uA

Histogram:                    MEAN      340.4nA

DCA RELIABILITY LABORATORY

PART NUMBER : 1N5623

VENDOR : MICRO SEMICOND

DATE CODE : 7634

VENDOR : MICRO SEMICOND

DATE CODE : 7633

VENDOR : SEMTECH

DATE CODE : 7631

VENDOR : SEMTECH

DATE CODE : 7531

| VEND / DC | MEAN | STD. DEV. | LOW PT | 10% PT | 90% PT | HIGH PT. |
|-----------|------|-----------|--------|--------|--------|----------|
|-----------|------|-----------|--------|--------|--------|----------|

IF IN AMPS AT 25 DEGREES  
AT VR=1000 VOLTS

|            |        |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|--------|
| MSI / 7634 | 1.500U | 5.238U | 207.0N | 248.0N | 481.0N | 25.50U |
| MSI / 7633 | 516.6N | 414.8N | 303.0N | 323.0N | 498.0N | 2.520U |
| SEMT/ 7631 | 58.39N | 59.17N | 19.70N | 20.30N | 96.80N | 309.0N |
| SEMT/ 7531 | 76.31N | 75.15N | 5.500N | 9.990N | 113.0N | 290.0N |

IF IN AMPS AT 150 DEGREES  
AT VR=1000 VOLTS

|            |        |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|--------|
| MSI / 7634 | 179.7U | 51.59U | 105.0U | 132.0U | 197.0U | 388.0U |
| MSI / 7633 | 216.7U | 80.74U | 81.10U | 89.10U | 303.0U | 357.0U |
| SEMT/ 7631 | 31.47U | 10.90U | 16.16U | 20.10U | 40.30U | 63.60U |
| SEMT/ 7531 | 47.36U | 20.24U | 23.90U | 24.30U | 71.10U | 99.90U |

VF1 IN VOLTS AT 25 DEGREES  
AT IF=300 MA

|            |        |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|--------|
| MSI / 7634 | 1.019  | 45.28M | 928.0M | 956.0M | 1.070  | 1.090  |
| MSI / 7633 | 998.8M | 52.14M | 914.0M | 928.0M | 1.060  | 1.060  |
| SEMT/ 7631 | 804.5M | 166.5M | 807.0M | 808.0M | 866.0M | 933.0M |
| SEMT/ 7531 | 787.6M | 181.1M | 813.0M | 822.0M | 821.0M | 881.0M |

## DCA RELIABILITY LABORATORY

PART NUMBER 11W5623

| VEND / DC | MEAN | SID. DEV. | LOW PT | 10% PT | 90% PT | HIGH PT. |
|-----------|------|-----------|--------|--------|--------|----------|
|-----------|------|-----------|--------|--------|--------|----------|

VF1 IN VOLTS AT -65 DEGREES  
AT IF=300 MA

|            |        |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|--------|
| MS1 / 7634 | 1.085  | 28.40M | 1.020  | 1.040  | 1.120  | 1.140  |
| MS1 / 7633 | 1.068  | 34.57M | 999.0M | 1.020  | 1.110  | 1.120  |
| SEMT/ 7631 | 953.4M | 9.152M | 937.0M | 940.0M | 961.0M | 979.0M |
| SEMT/ 7531 | 2.449  | 7.259  | 951.0M | 951.0M | 984.0M | 985.0M |

VF2 IN VOLTS AT 25 DEGREES  
AT IF=1.5 AMPS

|            |       |        |        |        |       |       |
|------------|-------|--------|--------|--------|-------|-------|
| MS1 / 7634 | 1.295 | 61.26M | 1.150  | 1.200  | 1.360 | 1.390 |
| MS1 / 7633 | 1.260 | 75.44M | 1.130  | 1.150  | 1.340 | 1.350 |
| SEMT/ 7631 | 1.045 | 48.44M | 978.0M | 983.0M | 1.090 | 1.170 |
| SEMT/ 7531 | 1.015 | 212.7M | 962.0M | 964.0M | 1.110 | 1.140 |

VF2 IN VOLTS AT -65 DEGREES  
AT IF=1.5 AMPS

|            |       |        |       |       |       |       |
|------------|-------|--------|-------|-------|-------|-------|
| MS1 / 7634 | 1.325 | 49.06M | 1.220 | 1.260 | 1.370 | 1.420 |
| MS1 / 7633 | 1.291 | 60.62M | 1.190 | 1.190 | 1.350 | 1.380 |
| SEMT/ 7631 | 1.154 | 25.15M | 1.110 | 1.120 | 1.180 | 1.190 |
| SEMT/ 7531 | 2.648 | 7.218  | 1.120 | 1.120 | 1.220 | 1.250 |

VF3 IN VOLTS AT 25 DEGREES  
AT IF=3.0 AMPS

|            |       |        |       |       |       |       |
|------------|-------|--------|-------|-------|-------|-------|
| MS1 / 7634 | 1.475 | 80.78M | 1.290 | 1.350 | 1.560 | 1.600 |
| MS1 / 7633 | 1.428 | 109.2M | 1.260 | 1.290 | 1.530 | 1.550 |
| SEMT/ 7631 | 1.217 | 63.47M | 1.120 | 1.120 | 1.280 | 1.370 |
| SEMT/ 7531 | 1.180 | 248.3M | 1.120 | 1.120 | 1.300 | 1.370 |

PART NUMBER : 1N5623

| VEND / DC | MEAN | STD. DEV. | LOW PT | 10% PT | 90% PT | HIGH PT. |
|-----------|------|-----------|--------|--------|--------|----------|
|-----------|------|-----------|--------|--------|--------|----------|

VF3 1W VOLTS AT -65 DEGREES  
AT IF=1.0 AMPS

|            |       |        |       |       |       |       |
|------------|-------|--------|-------|-------|-------|-------|
| MS1 / 7634 | 1.509 | 76.90M | 1.360 | 1.370 | 1.580 | 1.640 |
| MS1 / 7633 | 1.456 | 90.02M | 1.300 | 1.330 | 1.560 | 1.580 |
| SEMT/ 7631 | 1.325 | 59.67M | 1.210 | 1.240 | 1.400 | 1.450 |
| SEMT/ 7531 | 2.809 | 7.186  | 1.240 | 1.240 | 1.440 | 1.530 |

C01 FARADS AT 25 DEGREES  
AT 100 KHZ AND VR=0 VOLTS

|            |        |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|--------|
| MS1 / 7634 | 13.72P | 7.043P | 7.360P | 8.380P | 19.06P | 38.00P |
| MS1 / 7633 | 10.99P | 3.336P | 5.950P | 6.050P | 16.50P | 18.36P |
| SEMT/ 7631 | 58.75P | 8.590P | 47.03P | 49.03P | 72.43P | 75.20P |
| SEMT/ 7531 | 55.87P | 5.911P | 47.29P | 49.55P | 59.62P | 73.44P |

C02 FARADS AT 25 DEGREES  
AT 1KHZ AND VR=0 VOLTS

|            |        |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|--------|
| MS1 / 7634 | 9.133P | 2.467P | 5.850P | 6.090P | 12.03P | 13.60P |
| MS1 / 7633 | 7.962P | 2.471P | 4.770P | 4.860P | 10.09P | 17.79P |
| SEMT/ 7631 | 48.59P | 2.158P | 44.42P | 45.72P | 51.18P | 52.45P |
| SEMT/ 7531 | 48.59P | 2.172P | 44.72P | 45.00P | 50.89P | 53.94P |

TRR IN SEC.S AT 25 DEGREES

|            |        |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|--------|
| MS1 / 7634 | 230.9N | 9.491N | 220.0N | 220.0N | 240.0N | 250.0N |
| MS1 / 7633 | 231.6N | 13.17N | 200.0N | 220.0N | 250.0N | 250.0N |
| SEMT/ 7631 | 397.4N | 50.66N | 310.0N | 310.0N | 460.0N | 480.0N |
| SEMT/ 7531 | 328.8N | 60.87N | 230.0N | 230.0N | 400.0N | 450.0N |